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Housing Castings

We note with interest that a number of regional officers are to be appointed to act as " trouble shooters " in the building drive. We hope that these men will be given powers well in excess of those indicated by the salaries they are to receive. They are to visit the sites and ascertain why progress is, or is not, being made. Then they will return to their offices and write letters. But to whom will they address their enquiries? Will they have to send copies to half-a-dozen Government departments, or will they be able to canalise their correspondence to a superman who can cut all red tape and telephone, wire or write to Mr. Smith of Jones & Brown to overcome the troubles. However, it is an idea!

We have been making some enquiries as to the present position of builders' castings and find that the position is satisfactory in relation to the supply of other essential materials at the moment. That just means that bad as is the foundry position, other related industries are a shade worse. For the future the outlook is not at all promising if the drive for the provision of houses matures as is expected. It is then that the real shortages in any one section will be most prominently noticed, and if it be an iron casting then the whole of the foundry industry will get the blame. It appears to us that it would be worth while for the appropriate manufacturers' associations to make a periodical survey of the position, so that a balanced production can be organised. There must obviously be a relationship between the consumption of baths, stoves, cisterns, rainwater goods, in artisan housing estates. This balance will obviously require weighting as to certain types of castings to take care of industrial and scholastic buildings. Then, too, there is the need for catering for the export market, though in our opinion this should wait, as industrial production will continue to be hampered, until the population is properly housed.

At the moment, a number of foundries are being mechanised in order to speed-up production, and if these give a balanced production then there is but little doubt—providing the necessary labour is forthcoming—that the foundry industry will rise to the occasion. But we must be sure of that balance. The present doubt seems to be in connection with rainwater goods. Because of their length they are not the easiest class of casting to mass-produce, but it can and must be done on an ever-increasing scale, otherwise steel pressings and non-metallic components will replace foundry production.

Increasing attention must be given to rural housing problems as these are somewhat different from the urban requirements. It is said that it will be increasingly difficult to keep men on the land unless they are adequately housed. This, so far as the foundryman is concerned, means modern sanitation, heating and cooking facilities. How great a contribution can be made without main drainage and communal gas and electricity supply it is difficult to imagine. Yet the problem is no greater than operation Pluto, and its solution would be of incalculable ponents will replace foundry production.

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LIGHT METAL FOUNDERS' ASSOCIATION

GENERAL MEETING AT BIRMINGHAM

The general meeting of the Light Metal Founders' Association was held at the Imperial Hotel, Birmingham, recently. Mr. A. H. Sturdee, chairman of the Association, presided, and in the course of his report, expressed the appreciation of the members of the great work done by Mr. G. A. Woodruff, of J. Stone & Company, Limited, in the direction of the affairs of the Association during the first five years of its existence, in which period he acted as chairman. During the year, 38 meetings had been held, covering the activities of the executive, technical, planning, costing, development and commercial committees.

The chairman referred to several reports of price cutting. Whilst the Association was in no way a price control organisation, and had no aspirations to be such, and as the industry as a whole might suffer, he suggested that the attention of such firms should be drawn to the recommendations of the costing committee. After a reference to cast-aluminium window frames, and to the opening of the Foundry School, the chairman expressed his disappointment that the Ministry of Supply had not yet published the report made by a team of their members some eight or nine months ago. An invitation had been received from the Ministry of Supply Advisory Committee on Diecasting for co-operation in its work. Though established since the early days of the war, this committee had apparently confined its activities to zinc-base castings. The system of informal area meetings was to be strengthened. Co-operation with the Aluminium Development Association was receiving the close attention of the executive committee.

Technical Report

Mr. L. Fletcher (Northern Aluminium Company, Limited), the chairman of the technical committee, in his report, paid tribute to the work done by his predecessor in the chair, Mr. J. F. Paige. He referred to the completion of the work of preparing a standard sample of "Y" alloy for chemical composition, and the present position in the creation of a similar standard for D.T.D. 424. Full co-operation had been given to the various B.S.I., S.T.A.M. and S.M.M.T. committees in connection with the establishment of specifications, whilst the data sheets recently issued by A.L.A.R., Limited, were scrutinised before publication by the committee. Proposed new types of sand-cast test bars and chill-cast test bars for diecastings, have been tested, and detailed reports submitted to the M.A.P. without any conclusive results. The committee has, like all other technical bodies within the foundry industry, taken action with the Ministry of Labour in connection with siliceous parting powders.

Mr. H. Williams (Sterling Metals, Limited) reported on behalf of the commercial committee, and outlined the recommendations put forward in connection with the provision of free dies. This practice is to be re-

(*Continued at foot of next column.*)

BOOK REVIEWS

Science and Human Welfare, being the proceedings of a conference held in London and sponsored by the Association of Scientific Workers. Published by the Temple Fortune Press, Mildner Works, Herbal Hill, London, E.C.1. Price 2s. 6d.

This booklet runs to about 70 pages and is a very mixed bag. Much of it is platitudinous, and a little—especially that devoted to the atomic bomb and its implications—is of real interest. There is a good deal of political matter interspersed throughout the abstracts of the various speeches made, and here and there an insight into recent discoveries. For those with a scientific training the contents of the book will be found to be trite and uninspiring.

V. C. F.

Collective Bargaining and Decadence, by A. Grant McGregor. Published by Sir Isaac Pitman & Sons, Limited, Parker Street Kingsway, London, W.C.2. Price 5s. net.

The Author makes out a sound case for the discontinuance of collective bargaining for the establishment of industrial wages, and suggests its replacement by national and district wages boards. These bodies would see to it that wages are raised when prices fall, or better still, when prices would fall if wages were increased. This, it is suggested, "would increase consuming power and remove all seeming need for 'go slow' tactics to prevent unemployment."

The reviewer quite appreciates this theory, but if there be a glut of toys or tobacco in the shops, does the whole of the working population receive higher wages or only a section thereof? From the text it seems that only the large employers would be instructed to pay an advance. However, it can be presumed that there would have to be a glut in a wide range of industries before action would be taken. The book is certainly very interesting and provocative of thought.

V. C. F.

(*Continued from previous column.*)

placed by one which debits the customer with a substantial proportion of the properly ascertained cost. The balance is to form part of the foundry overheads and not just debited to the toolroom.

Mr. F. A. Hoult (Kent Alloys, Limited) gave a short report as chairman of the development committee, and Mr. W. G. A. Russell (Diecastings, Limited), chairman of the costing committee, referred to the series of reports which were being issued.

At the annual meeting which followed, Mr. A. H. Sturdee was re-elected chairman, Mr. G. E. Roberts (Coventry Malleable & Aluminium Casting (1903), Company, Limited) his deputy, and Mr. J. F. Paige (William Mills, Limited) vice-chairman. The committees for the ensuing year were restaffed, and Mr. Eric L. Heathcote, F.C.A. (of Heathcote & Coleman) was re-elected secretary.

CASTINGS AND WELDINGS*

By SIR CLAUDE D. GIBB, C.B.E., F.R.S.

This year's "Edward Williams Lecture" reveals modern tendencies in design.

A study of the list of distinguished scientists who ave delivered the Edward Williams Lecture in pre- ious years makes one realise the importance of this ccasion and the great honour conveyed by the in- itation to take part in this annual conference. The hoice of a subject, which generally is a problem of ome difficulty, was in this case relatively easy since he factor uppermost in mind at the time of receiving n invitation was the inability to secure adequate upplies of iron castings from 5 to 15 tons in weight. A survey of the supply sources of Great Britain indi- ated a very grave shortage of iron castings in that eight range.

The reasons for this are many. During World War I the demand for heavy iron castings was lower than ormal while that for steel castings much above aver- ge. Steel foundry capacity was increased and many ron moulders transferred to steel, whilst others were alled up for the armed forces. To-day, there is ade- uate steel casting capacity, but a desperate shortage f iron moulders to restore even the pre-war output f iron castings, yet the immediate demand appears o be above that ruling in 1938 and 1939.

There is evidence that those moulders who are being r have been demobilised are not all anxious to return o foundry work. This is not really surprising when here is a general manpower shortage in industry and many foundries do not provide very attractive condi- ions of employment. If a moulder can secure a clean job in a factory or elsewhere, is he to be blamed for not wanting to return to an unnecessarily dirty and moky foundry? Not all foundries are dirty, but many re, and quite uneconomically so. There has grown up over the years a belief that a foundry must of necessity be a place of sand-heaps and fettling dust, that a moulder must look like a pitman at the day's end. It is all very well to talk about the "dignity of labour" and to claim that coal and iron alike are national necessities and it is therefore a duty of citizen- ship to work in those industries. A coal hewer recently gave the answer when saying "Them that wants coal can come and get it." Few honest people disagree in their hearts with that remark.

The Yorkshire (or is it Lancashire) saying "Where there's muck there's brass" has less force to-day than several decades ago. The snobbery of craftsmanship is greater to-day than ever before and, entirely wrong though it is, the moulder is regarded as somebody lower in the social scale than the artisan who can leave work looking reasonably clean and tidy. Hence, when a choice of occupation is available, the young men of the future will avoid the foundry unless . . . The unless is—unless foundries are made cleaner, more attractive and with higher pay—unless the caste of the foundryman is raised—unless the snobbery of human nature is changed. When a man is accused of being a snob he is most indignant, but we all are in one way or another. Mostly it is entirely subconscious and we are not aware of our own particular snobbery.

So far as this lecture is concerned, the fact that these problems do exist and that there is a serious supply shortage of heavy iron castings led to the selection of the title and subject. The company with which the lecturer is associated is one of the major manufacturers of turbo-alternators and power generating and distributing equipment. Within these works is both an ironfoundry and a well-equipped steel fabricating department. The designers are equally familiar

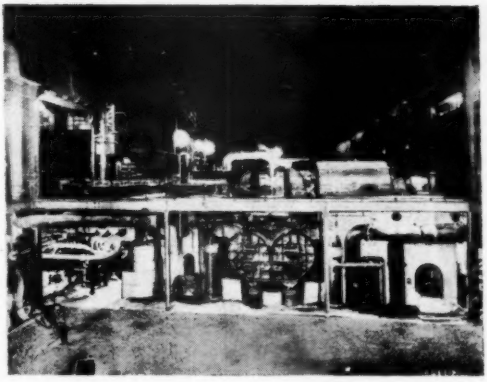


FIG. 1.—A 30,000-KW. TURBO-ALTERNATOR AS INSTALLED.

with the problems of fabrication or moulding. There is an efficient pattern shop. Thus the decision to use steel or iron has, in the past, been made solely on the technical merits or, if these are equal, on the ultimate production costs. The words "ultimate production costs" are used deliberately because almost invariably appreciable machining must be carried out before the component is finished, and machining may be greater in cost and amount with one or other material.

In a recent article in the technical Press, the term "weldings" was used when referring to steel structures fabricated by welding. It is so apt that it is being adopted throughout this lecture. When the term "castings" is used the reference is to iron castings, while "weldings" are those components formed by

* The "Edward Williams Lecture" delivered at the Birmingham Conference of the Institute of British Foundrymen.

Castings and Weldings

gas-flame cutting or machining with subsequent bending or manipulation and finally joined by welding which may be gas or electric but generally the latter.

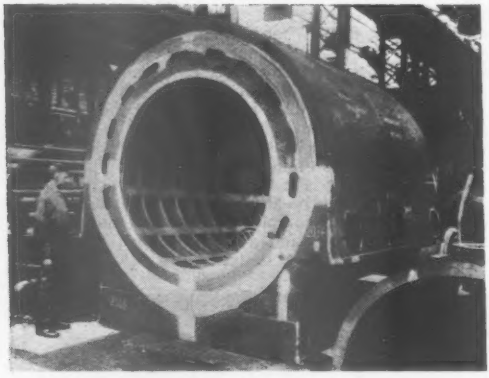


FIG. 2.—A 1929 STATOR CASING MADE AS A CASTING WEIGHING 20 TONS.

In pre-war years, technical considerations made it fairly easy to decide which components were to be castings and which weldings. One particularly easy case was an alternator stator casing where the ideal ventilating system for cooling could not be obtained with a casing because of the impossibility of moulding

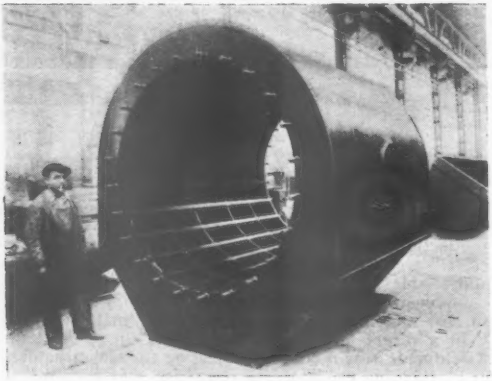


FIG. 3.—A SIMILAR CASING TO FIG. 2 MADE AS A WELDING WEIGHING 12.75 TONS.

as a single piece unit. With the introducton of weldings the designer produced the ideal ventilation scheme and merely offered up a prayer for the welder. Thus weldings made possible a big advance in electric generation. Fig. 1 shows a general view of a 30,000 kW. turbo-alternator with its condenser as installed in a British power station. Fig. 2 shows a 1929 stator casing as a casting having a weight of 20 tons and, corrected for advances in prices since that date, costing to-day £1,150 or 6.16d. per lb. Fig. 3 shows a similar casing produced as a welding. The weight has

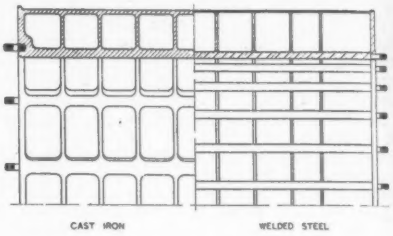


FIG. 4.—ALTERNATOR STATOR CASINGS.

been reduced to 12.75 tons with a cost of £860 or 7.2d. per lb. The difference in design between these two casings (Fig. 4) shows how the outer wall thickness was reduced from $1\frac{1}{16}$ to $\frac{3}{8}$ in.

In this particular example the machining to be carried out is not sensibly different whether as casting or welding, but the weight difference is important in larger stators since the transport of large capacity alternators from factory to power station often dictates the electrical design. Fig. 5 shows a stator being transported from factory to Hams Hall Power Station of the Birmingham Corporation Electricity Department. A special train was required for this purpose and Fig. 6 shows how the limiting diameter of stator

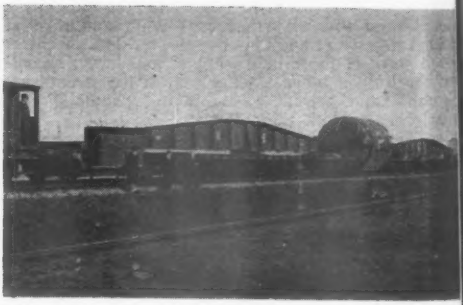


FIG. 5.—SHOWING TRANSPORTATION OF A LARGE STATOR.

was determined by its ability to pass under the *centre* of railway bridges. Fig. 7 is the welded stator casing of a large electric motor for marine propulsion. This is one of four similar installations being fitted to the new "Beaver" line of ships for the Canadian Pacific Steamships Company. Fig. 8 shows the skeleton construction in an early stage of fabrication. Fig. 9

FIG. 6.—SHOWS HOW TUNNELS IMPOSE LIMITATIONS ON DESIGN.

shows the welding in the boring machine. Fig. 10 shows one of the complete motors being lifted into the ship during fitting out.

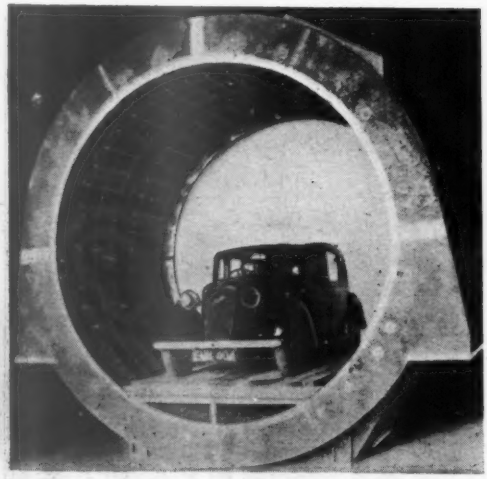


FIG. 7.—A WELDED STATOR CASING FOR AN ELECTRIC MOTOR FOR MARINE PROPULSION.

The shell of a turbine condenser is a case by no means clear cut for casting or welding. Having capacity for both casting and welding, personal choice has been for welding, but there are at least three large condenser builders who use castings—probably because this suits their manufacturing facilities rather better. Fig. 11 shows a complete welded condenser

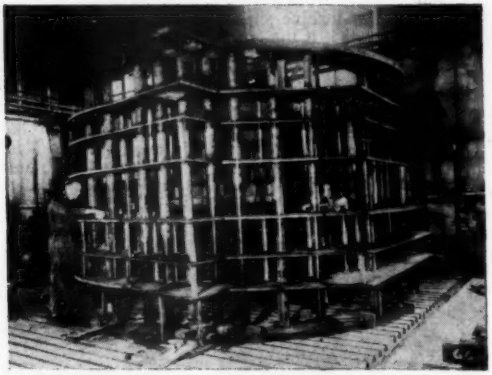


FIG. 8.—SHOWS THE SKELETON STRUCTURE FOR A STATOR CASING IN AN EARLY STAGE OF FABRICATION.

shell but with condenser water boxes which are of cast iron largely because of their slightly greater resistance to certain tidal water corrosion.

A few years ago, all turbine builders used castings

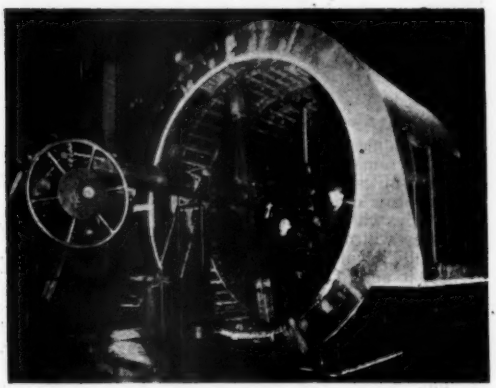


FIG. 9.—SHOWING THE WELDING DURING MACHINING OPERATIONS.

D

Castings and Weldings

for turbine exhaust ends. To-day many are using weldings. This component, seen in Fig. 12, is one of the largest and most important in a turbine and is not an easy casting to make. Inside it has a high vacuum and must be free from porosity; it supports the heaviest portion of the turbine shaft and also one end of the alternator rotor; it is the component most likely to have high frequency vibration forces applied to it. Because of many casting "scrappers," turbine builders are being driven to weldings.

This brings out a point not always sufficiently appreciated by the welding enthusiast. Cast iron has very high internal damping and is much less resilient than steel. Hence, if carrying a vibrating load, there is less likelihood of vibrations being transmitted through cast iron than through steel. It is quite true that

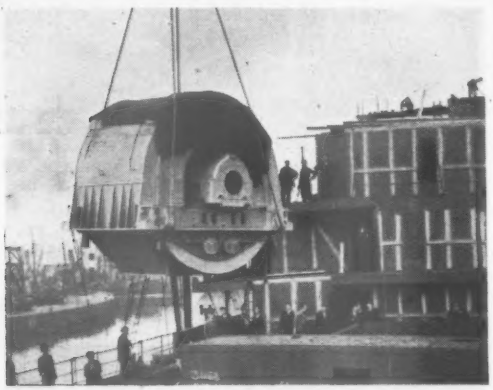


FIG. 10.—THE COMPLETE MOTOR BEING LOWERED INTO THE SHIP.

design modifications may make steel entirely suitable, but there remains the fundamental vibration absorbing property of cast iron. Who has not heard the saying "cast iron is dead" while "good steel rings."

Latterly, with foundries able to pick and choose the jobs they will accept, few would undertake an exhaust end with its attendant risk of proving a scrapper. Hence, it almost became a case of weldings or nothing. Fig. 13 shows an interesting compromise where the completed whole is made up of a casting and two weldings. The casting carries the load and the awkward shapes, while being simplified in moulding and pouring, and made smaller in size and weight by the splitting up into three. The weldings were ideal shapes for fabrication. Fig. 14 shows the complete casting alongside the compromise of castings and weldings.

Large alternator bedplates are best, it is submitted, as a compromise between castings and weldings, although here again the shortage of casting capacity is making it necessary to review design. Fig. 15 shows a complete bedplate where the two side limbs are of cast iron although the ends are weldings. There is

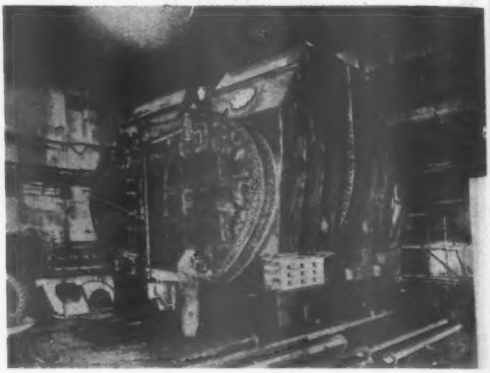


FIG. 11.—WELDED CONDENSER SHELL WITH CAST-IRON CONDENSER WATER BOXES.

a reason for this apparent anomaly. The outboard motor bearing load is carried on steel which is not as recommended earlier in this Paper. In this case,

FIG. 12.—TURBINE EXHAUST END.

the bedplate immediately under the bearing pedestal actually supporting the shaft can be filled to the top with concrete during grouting and thus be "deadened," while the bearing pedestal itself is cast iron and thus absorbs some of the potential or existing vibration.

The side limbs, however, are merely carrying an apparent static load of the alternator stator and at

FIG. 13.—A COMPOSITE CONSTRUCTION OF CASTINGS AND WELDINGS.

first sight need not therefore be of cast iron for vibration reasons. The magnetic fields of the stator, however, are rotating with the rotor and a vibration double the frequency of generation may be produced which, although small in magnitude, is troublesome in its effects and may be transmitted considerable distances with strange acoustic repercussions. Hence the adoption of cast iron side limbs has a solid reason based on experience.

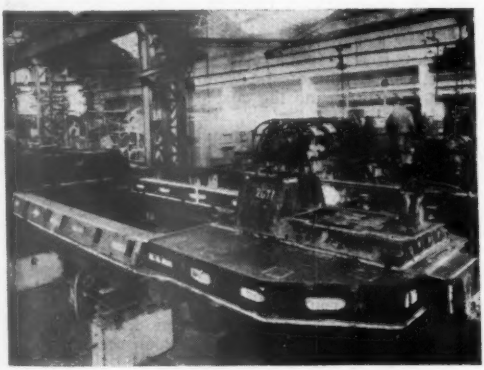


FIG. 15.—AN ALTERNATOR BEDPLATE IS A COMPOSITE CONSTRUCTION.

The magnet yoke of the alternator exciter is generally cast iron even though constructionally there is a good case for welding: residual magnetism is a necessary property in some exciter magnets so that the yoke must be cast iron. Fig. 16 shows a complete exciter magnet and Fig. 17 compares the construction of a typical cast-iron magnet frame with a welded counterpart.

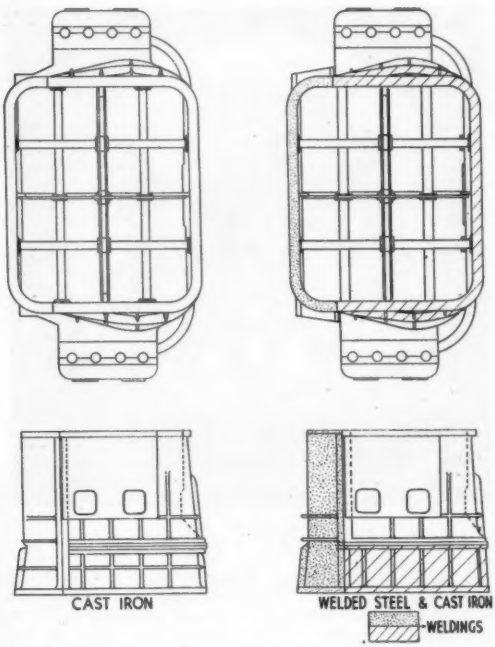


FIG. 14.—SOME OF THE COMPONENTS USED IN THE CONSTRUCTION OF THE MACHINE SHOWN IN FIG. 13.

There are to-day and probably always will be, enthusiasts for weldings and others for castings. Their enthusiasm frequently colours the analysis on which the decision is taken. The casting advocate claims that if there are several hundred off one article and therefore pattern costs are spread over a large number of castings, the casting is not only much lower in cost

Castings and Weldings

but more uniform in accuracy and quality. This may not be so if the welding is prepared and jigged with the same care as would apply to a machining operation. One thing this past war has taught us is the necessity to get away from the idea that welding is a means of producing a "one off" article or of repairing something broken in service. Welding has rapidly become a science, calling for high engineering and metallurgical skill. With the necessary control at all stages, weldings have a field in industry which is quite unchallengeable.

The inability of ironfoundries to supply the present-

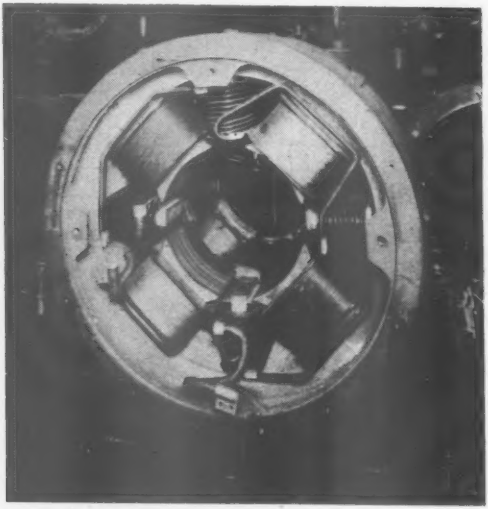


FIG. 16.—EXCITER MAGNET.

day demand for castings indicates, however, that the phenomenal growth of weldings has not reduced the call of castings. There is, and will continue to be, a field in industry for both. Sometimes the case for one or the other will be clear cut, other times the issue will only be decided by a close study of all aspects which must include the final costs including pattern costs, jigging and preparation charges and final machining costs. In weldings it is often possible to machine and drill facings, etc., before final assembly and welding. Thus a smaller and lower hourly charge machine tool may be used than the similar operation on a casting.

In the preparation of this lecture, an attempt was made to lay down some broad rules by which to guide the designer in deciding for weldings or castings. So many variables can affect the decision that ultimately the attempt was abandoned. Manufacturing facilities available in the particular factory may make the decision for the designer and over-rule technical considerations. Whether there be one-off or a hundred-off may make the decision. Whether the stresses applied in service be mainly tensile or compressive may decide. Whether weight is important, a particular shape, all these and more influence the choice.

About 1926 there was a wild burst of enthusiasm for weldings and many prophesied the end of foundries. It was claimed that there was nothing produced as a casting that could not be made better as a welding. Those enthusiasts made many mistakes—particularly in weight reduction. It was argued that as the ultimate tensile strength of cast iron was some 12 tons and mild steel 28 to 32 tons, the welding could be made 12/28ths the weight of the casting. "Less than half the weight" was the common claim. With certain components, that was correct, particularly where a tensile stress had to be sustained and the welding

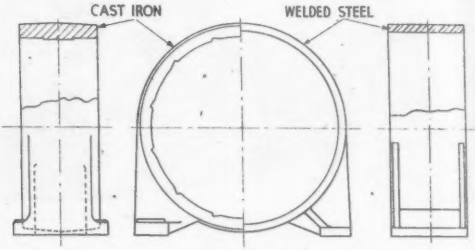


FIG. 17.—SHOWING THE COMPOSITE NATURE OF FIG. 16.

could be designed so that the primary tensile stress was carried on a through steel bar or plate without loading an actual welding. In other cases, particularly bedplates, it was found that for equal satisfaction in service, the weight of the weldings was little, if any, less than castings and the cost by no means in favour of weldings.

Experience has now accumulated and there is no suggestion that foundries are going out of existence unless they do so for lack of labour. At the lecturer's works there is a long waiting list of youngsters wanting to become apprentices in the machine, fitting and electrical shops. Yet apprentices cannot be obtained for the foundry which is an average one in size, equipment, and cleanliness. It is the same story from most iron founders. Foundries *will* go out of existence if you gentlemen do not take action. It will not be because of the competition from weldings. Personal experience is that foundrymen are extremely conservative—so are marine engineers and shipbuilders —and largely for the same reason—a mistake due to

(*Continued on page* 191, *column* 2.)

STANDARD TEST-BARS FOR THE NON-FERROUS FOUNDRY*

By FRANK HUDSON, F.I.M.

Introduction

Test-bars have been the subject of many arguments during the last few years, both in this country and abroad, particularly regarding their function in the wider aspect of the testing of castings. In the past, most thought has centred on the possibility of utilising either "cast-on" or separately-cast test-bars as a means of assessing the quality of castings. In 1931[1] a meeting was held at Zurich of the International Association for Testing Materials, when it was evident that separately-cast test-pieces were preferred by the great majority of those present, and this corresponded with the practice then being employed in Belgium, Czechoslovakia, Germany, Great Britain, Holland, Switzerland and the United States of America. On the other hand, the use of small test-pieces taken from the actual castings was advocated by the French representatives.

This latter point received further attention in 1932[2] at a general discussion on the testing of castings arranged by the Institute of Metals, in London, when Dr. Rosenhain remarked that the extensive work of French metallurgists in this direction must be regarded as of great value, and he prophesied that ultimately agreement would be reached in any consistent scheme of inspection as to the proper places of the small test-pieces, cut from the casting, and the larger separately-cast test-bar. How true this statement proved to be is now evident following the recent co-operative effort by British founders and users of non-ferrous castings, in conjunction with the British Standards Institution, which has resulted in the evolution of a Code of Procedure in Inspection of Copper-base Alloy castings.[3] This document clearly indicates the relative positions of test-pieces cut from the actual casting and those case separately.

During the preparation of this Code of Procedure it was felt that considerable benefits would result if a standard form of separately-cast test-bar could be recommended which led to a certain amount of work being done on this subject by various foundries throughout the country, the results of which form the basis of this Paper.

Designs of Bars Tested

Whilst a separately-cast test-bar can never be designed to assess the quality of a casting, it can fulfil a useful purpose by indicating the quality of the metal from which it is cast, and the degree of control exercised in the foundry. Accordingly, any design adopted as a standard should be sensitive to the effects of dissolved gas, entail minimum wastage of metal and machining time, yet provide adequate and simple means of obtaining a sound bar. Furthermore, it is obvious that ideal conditions would be best met if one design of bar could be evolved capable of giving consistent results with the variety of copper-base alloys in service. With these thoughts in mind, the following designs of test-bars were selected as being most likely to warrant further investigation.

(1) *Keel Bar.*—A modified form of wedge bar, as shown in Fig. 1, designed by J. Stone & Company, Limited, in which the feeding head has been reduced to a minimum in order to conserve metal and simplify cutting-off operations without sacrificing feeding effect.

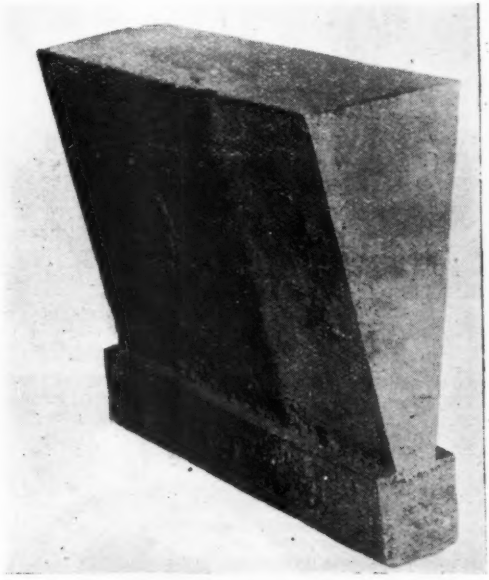


FIG. 1.—KEEL BAR. THE METAL FOR THIS BAR IS POURED DIRECT INTO THE FEEDING HEAD OR RUN FROM THE BOTTOM ACCORDING TO THE TYPE OF ALLOY EMPLOYED. WEIGHT OF METAL REQUIRED APPROXIMATELY 8 TO 9½ LB. PER BAR.

The weight of metal required to cast one test-bar is approximately 8 to 9½ lbs., according to the type of alloy employed.

(2) *Institute of British Foundrymen's Bar.*—I.B.F. bar, as originally recommended in 1936,[4] modified by

* A Paper read before the Institute of British Foundrymen at the Birmingham Conference.

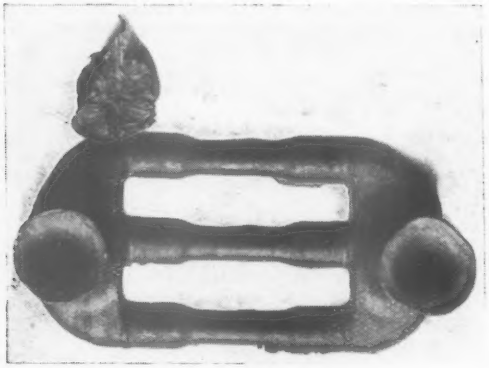
Standard Test-bars

J. Stone & Company, Limited, to make three test-bars from the same pattern, as illustrated in Fig. 2. The weight of metal required is approximately the same as that given for the Keel bar.

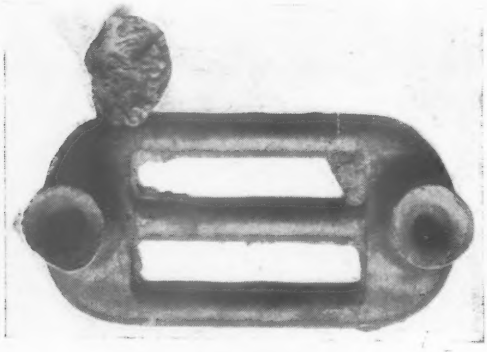
(3) *Eash Type of Bar.*—Shown in Fig. 3, as used in the United States. Approximately 10 to 11½ lbs. of metal required per bar.

(4) *British Non-ferrous Metals' Research Association Bar.*—A new form of universal test-bar, as outlined in Fig. 4, put forward by the above Association following the work of W. A. Baker.[9] This design is most economical, so far as metal weight is concerned, requiring only 5 to 6 lbs. per bar.

With the exception of the Keel bar, all the above

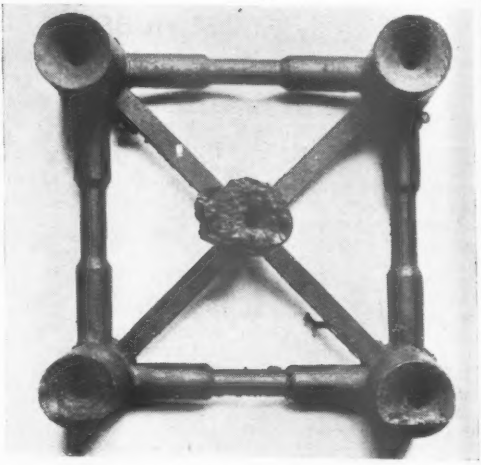


A—Shaped Bar.

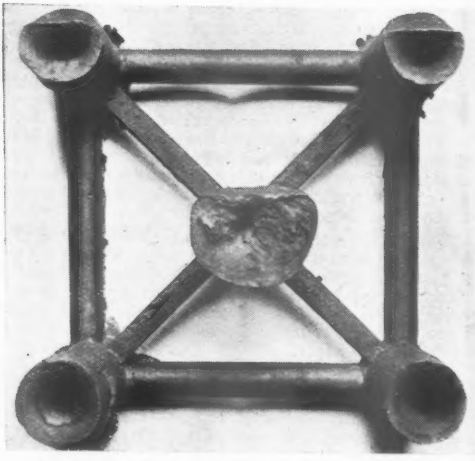


B—Parallel Bar.

Fig. 2.—Institute of British Foundrymen's Bar.—Weight of metal required, approximately 8 to 9½ lb. per bar.



A—Shaped Bar.



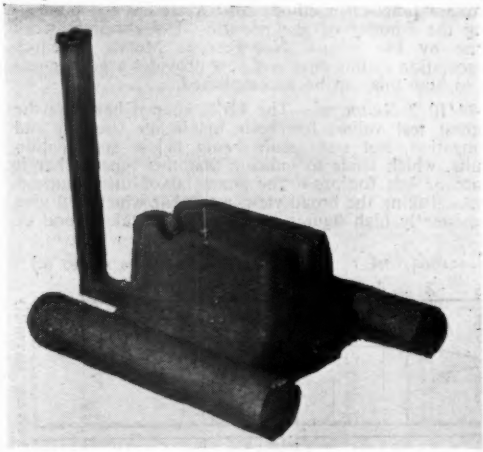
B—Parallel Bar.

Fig. 3.—Eash Type of Bar. Weight of metal required approximately 10 to 11½ lb. per bar.

TABLE 1.—*Composition of Alloys Used for Test-bar Trials*

Alloy	Specification No.	Composition, per cent.								
		Copper	Tin	Zinc	Lead	Nickel	Phos.	Al.	Mang.	Iron
Aluminium Bronze	B.S. 1073	Bal.	—	0.5 max.	—	3.0-5.5	—	8.5-10.5	3.0 max.	3.0-5.5
Manganese Brass....	B.S. 208/1	54.0 min.	Bal. other elements 5.0 per cent.							
Phosphor Bronze....	B.S. 421	Bal.	11.0-13.0	0.3 max.	0.5 max.	0.5 max.	0.15min.	—	—	—
88/10/2 Gunmetal	B.S. 383	Bal.	9.5-10.5	1.5-2.5	0.5 max.	1.0 max.	—	—	—	—
85/5/5/5 Gunmetal	B.S. 898	Bal.	4.0-6.0	4.0-6.0	4.0-6.0	1.0 max.	—	—	—	—

A—SHAPED BAR.



B—PARALLEL BAR.

FIG. 4.—BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION'S BAR. WEIGHT OF METAL REQUIRED APPROXIMATELY 5 TO 6 LB. PER BAR.

patterns were cast in both the shaped and parallel forms in green-sand moulds by 12 foundries throughout the country in five different alloys, namely, aluminium bronze, manganese brass, phosphor bronze, 88/10/2 gunmetal and 85/5/5/5 gunmetal, having the type compositions as shown in Table I. A careful check on pouring temperatures and moulding sand conditions was also maintained. The pouring temperatures employed were approximately as follow:—Aluminium bronze, 1,200 deg. C.; manganese brass, 1,020 deg. C.; phosphor bronze, 1,120 deg. C.; 88/10/2 gunmetal, 1,170 deg. C.; and 85/5/5/5 gunmetal, 1,140 deg. C.

The green sand used in the tests had the following properties:—Moisture, 5.5 to 6.5 per cent.; A.F.A. green compressive strength, 6.0 to 8.5 lbs. per sq. in.; A.F.A. green permeability No., 20 to 50.

All the test-pieces were machined to 0.564 in. dia., and their mechanical properties plotted graphically, as shown in Figs. 5 to 9.

Results Obtained

In considering the results obtained, it will simplify matters to discuss the effects of the various forms of test-bars on the alloys employed.

Aluminium Bronze.—Quite obviously, the Keel bar gives the most consistent results with aluminium bronze, and one need anticipate little anxiety in being able to meet specification requirements when using this form of test-bar. Next best is the shaped B.N.F.M.R.A. bar. The I.B.F. and Eash patterns do not appear to be satisfactory.

Manganese Brass.—Here. again, the evidence obtained tends to support the suitability of the Keel bar, although the B.N.F.M.R.A. pattern is a close second.

Phosphor Bronze.—More trouble is usually experienced by the non-ferrous founder in obtaining satisfactory results from sand-cast phosphor-bronze test-bars than with any of the other bronzes, and the results

Standard Test-bars

obtained in this instance only serve to confirm this statement. Not one of the test-bar patterns gave consistent results within the specification limits. The Keel bar and the B.N.F.M.R.A. pattern, in both the shaped and parallel forms, proved the best of those tried, but 50 per cent. of the test figures were slightly below specification for maximum strength. Quite probably the reason for this can be explained by variations in the amount of dissolved gas present in test-bars from different foundries. A design of test-bar which will show this effect is, of course, desirable, providing there are suitable practical methods also available for controlling the amount of gas present. The excellent work done by the British Non-Ferrous Metals Research Association in this direction now provides a good guide as to how this can be accomplished.

88/10/2 *Gunmetal.*—The I.B.F. shaped bar gave the highest test values for both maximum strength and elongation, not one result being below specification limits, which tends to indicate that this type of bar is more or less foolproof for gunmetal of this composition. Taking the broad view, a test-bar which will give consistently high figures, whether the metal is good or bad, is not going to benefit the foundryman very much in the long run.

The heavier sectioned test-bars, providing slower cooling conditions, such as the Keel and I.B.F. parallel bars, gave lower properties, although the results were more consistent. It is interesting to note that, when using the Keel bar, the maximum strength values obtained varied from 14 to 18.5 tons per sq. in., and 50 per cent. of the foundries conducting the tests managed to pass the specification limit. It is probable that these lower test figures are again due to the effects of dissolved gas in the metal.

85/5/5/5 *Gunmetal.*—It is now known that gunmetal of this type is less susceptible to the effects of dissolved gas than either 88/10/2 gunmetal or phosphor bronze. Accordingly, one would anticipate that the 85/5/5/5 alloy should give satisfactory results with the slower cooled bars, and it is interesting to note that this is confirmed by the test results obtained. The Keel bar gave particularly consistent test figures, all well above specification limits, with both forms of the B.N.F.M.R.A. pattern in second place. The highest test results were recorded by the I.B.F. shaped pattern, but these were not consistent.

During the course of these trials one or two tests were also conducted, in a less complete form, using

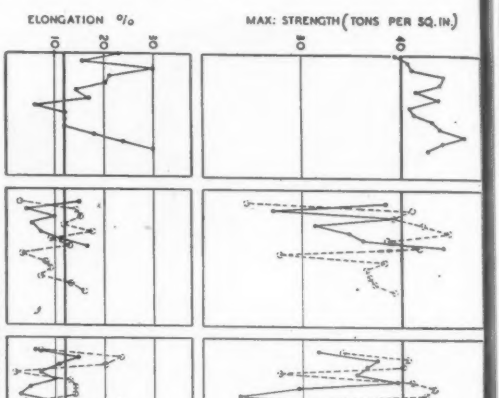


FIG. 5.—TEST RESULTS OBTAINED WITH ALUMINIUM BRONZE.

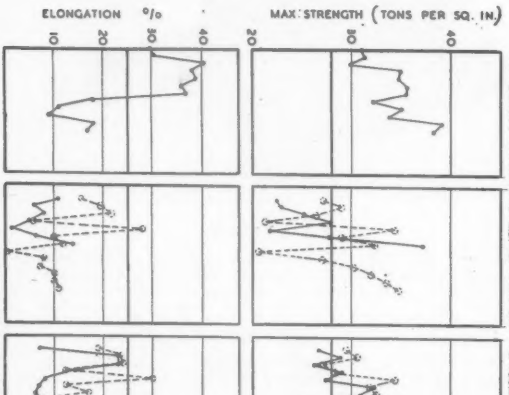

ELONGATION %
MAX: STRENGTH (TONS PER SQ. IN.)
FIG No.1 KEEL TEST BAR
FIG No.2 MOD. I.B.F. TEST BAR
FIG No.3 LEASH TEST BAR
FIG No.4 B.N.F.M.R.A. TEST BAR
NUMBER OF TEST BARS CAST
SPECIFICATION LIMIT
PARALLEL BARS
SHAPED BAR

FIG. 6.—TEST RESULTS OBTAINED WITH MANGANESE BRASS.

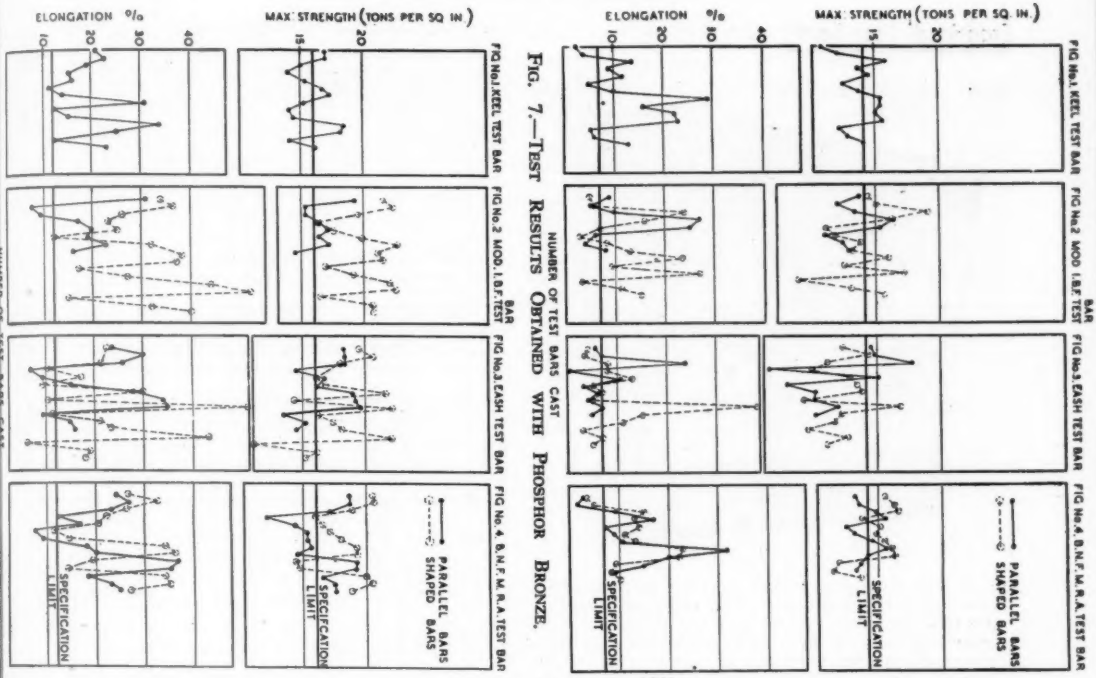

ELONGATION %
MAX. STRENGTH (TONS PER SQ. IN.)
FIG No.1. KEEL TEST BAR
FIG No.2. MOD. I.B.F. TEST BAR
FIG No.3. EASH TEST BAR
FIG No.4. B.N.F.M.R.A. TEST BAR
SPECIFICATION LIMIT
PARALLEL BARS
SHAPED BARS
NUMBER OF TEST BARS CAST

FIG. 7.—TEST RESULTS OBTAINED WITH PHOSPHOR BRONZE.

Monel when it was found that both the Keel bar and the B.N.F.M.R.A. patterns gave good results.

Conclusions

As a result of these tests it has been recommended to the British Standards Institution that the Keel bar should be tentatively adopted as a standard for copper-base alloy castings. In the final design put forward, as illustrated in Figs. 10 and 11, a slight modification was thought desirable, namely, that the bar should be made round instead of having a square section. This will facilitate machining operations and provide a more rapid rate of cooling which is, no doubt, desirable when this bar is used for phosphor bronze and certain types of gun-metals. It is appreciated that in odd cases some initial difficulty may be experienced in meeting existing specification requirements for gunmetal of the 88/10/2 and 86/7/5/2 types and for phosphor

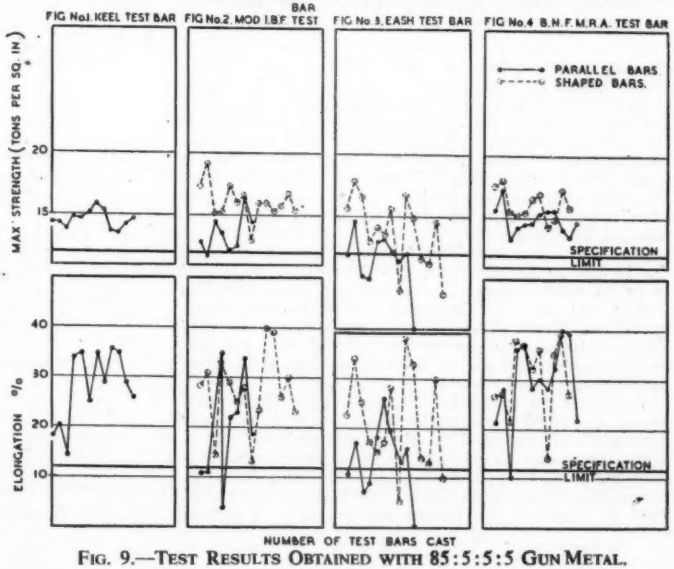


FIG No.1. KEEL TEST BAR
FIG No.2. MOD I.B.F. TEST BAR
FIG No.3. EASH TEST BAR
FIG No.4. B.N.F.M.R.A. TEST BAR
MAX. STRENGTH (TONS PER SQ. IN.)
ELONGATION %
PARALLEL BARS
SHAPED BARS.
SPECIFICATION LIMIT
NUMBER OF TEST BARS CAST

FIG. 9.—TEST RESULTS OBTAINED WITH 85:5:5:5 GUN METAL.

Standard Test-bars

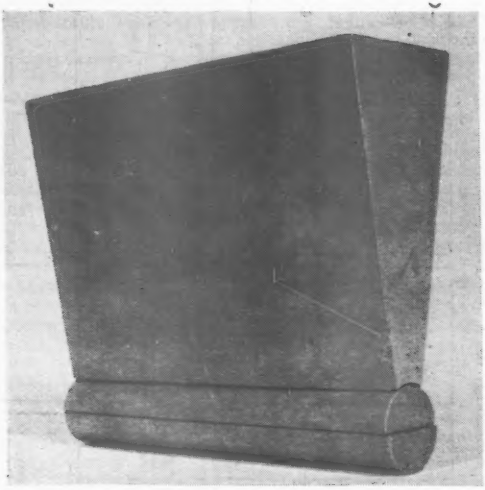


FIG. 10.—DESIGN OF KEEL BAR FINALLY RECOMMENDED AS A TENTATIVE STANDARD.—FOR ALUMINIUM BRONZE AND MANGANESE BRASS, THE TEST BAR SHOULD BE RUN FROM THE BOTTOM BY MEANS OF A SMALL INGATE ATTACHED TO ONE END OF THE BAR. FOR OTHER ALLOYS, DIRECT POURING INTO THE FEEDING HEAD SHOULD BE SATISFACTORY.

bronze, when using the Keel test-bar, and for the time being it is suggested that the I.B.F. shaped bar, illustrated in Figs. 2 and 12, might be allowed as an alternative for these alloys. There is every reason to believe, however, that the form of Keel bar recommended will ultimately prove satisfactory for all copper-base alloys when foundrymen become more familiar with its use, and for the purpose of standardisation the adoption of one design of test-bar is a distinct advantage.

At one time the B.N.F.M.R.A. design of universal bar looked particularly promising. From the theoretical point of view it appears ideal both as regards feeding action and economy in metal. Unfortunately, some trouble was experienced due to entrapped oxide and dross inclusions on the test-pieces, and it is felt that further study will have to be given to running methods if consistent results are to be obtained.

It should be pointed out that in considering this work, it is well to remember that it was done under the stress of war and is, therefore, perhaps not as complete as one would like. It is to be regretted that time did not allow for the inclusion of other forms of test-bars, such as the Crown or Webbert type so widely used in Canada,[6] the United States and to a certain

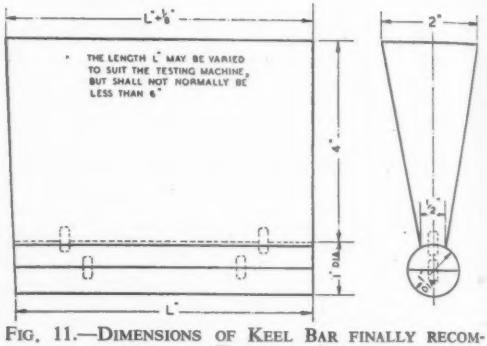


FIG. 11.—DIMENSIONS OF KEEL BAR FINALLY RECOMMENDED AS A TENTATIVE STANDARD.

extent in modified form in Great Britain. Similar remarks apply to the D.T.D. type of bar, as used for light alloys. It should be mentioned, however, that some of these designs have been investigated by Baker[5] and the results of this work received due consideration in drawing up the present programme. At the same time it will be observed that there is considerable similarity of design between the standard form of Keel bar put forward and the Crown and Webbert type.

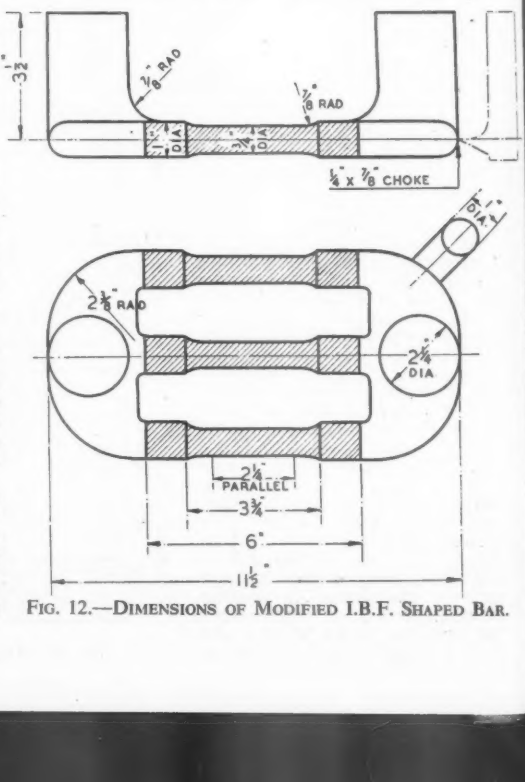


FIG. 12.—DIMENSIONS OF MODIFIED I.B.F. SHAPED BAR.

Acknowledgments

The Author is indebted to those collaborators whose assistance has made this investigation possible, namely, Mr. G. T. Callis, of J. Stone & Company, Limited; Mr. W. A. Baker, of the British Non-Ferrous Metals Research Association; Mr. F. C. Evans, of Langley Alloys, Limited; Mr. J. F. B. Jackson, of David Brown & Sons (Huddersfield), Limited; Mr. G. L. Harbach, of Worthington-Simpson, Limited; Mr. R. T. Rolfe, of W. H. Allen, Sons & Company, Limited; Mr. R. F. Hudson, of the Phosphor Bronze Company, Limited; Mr. A. P. Wright, of T. M. Birkett & Company, Limited; Mr. J. Arnott, of G. & J. Weir, Limited; Mr. G. W. Reid, of the Manganese Bronze & Brass Company, Limited; Mr. J. E. O. Little, of Glenfield & Kennedy, Limited, and the Mond Nickel Company, Limited. Thanks are also due to British Standards Institution Sub-Committee NF/14 for permission to publish the results obtained.

REFERENCES

1 W. Rosenhain, J. Inst. Metals, 1932, 48 (No. 1), page 284.
2 W. Rosenhain, J. Inst. Metals, 1932, 48 (No. 1), page 309.
3 "Code of Procedure in Inspection of Copper-base Alloy Castings" (British Standards Institution) not yet published.
4 "Recommendations for Two Leaded Gunmetals," Proc. Inst. Brit. Found., 1935-36, 29, page 349.
5 W. A. Baker, Proc. Inst. Brit. Found., 1943-44, 37, page B54.
6 "Canadian Practice for the Casting of Non-ferrous Test-bars, FOUNDRY TRADE JOURNAL, Jan. 27, 1944, page 78.

MANUFACTURE OF FARM MACHINERY

RESTRICTIONS RELAXED

The Farm Machinery (Control of Manufacture and Supply) Order, 1946, made by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, and dated May 27, revokes and re-makes in a modified form the Farm Machinery (Control of Manufacture and Supply) Order, 1943, and the Farm Machinery (Prescribed Types) (No. 1) Order, 1943. The principal amendments are:—

(1) Registration of manufacturers of farm machinery set out in the first Schedule is substituted for the licensing of manufacturers, and the licensing of dealers is abolished.

(2) The power to issue directions to manufacturers regulating the types and quantities of farm machinery they may manufacture is revoked.

(3) Power is provided to issue directions (*a*) to manufacturers prescribing the part of their output of farm machinery to be set aside for export, and (*b*) to manufacturers and dealers requiring that farm machinery considered by the Minister to be in short supply shall be supplied to such persons as the Minister may prescribe.

(4) The control of prices is restricted to a short list of machinery set out in the Second Schedule.

A DEBATE on "Should Iron and Steel be Nationalised?" between Mr. Robert Shone, Economic Director and Secretary of the British Iron and Steel Federation, and Mr. S. N. Evans, M.P., will be heard at 8 p.m. to-morrow (Friday) in the B.B.C. Home Service.

CASTINGS AND WELDINGS

(*Continued from p.* 184.)

change of technique is very costly and hence you stick to the devil you know. In general, metallurgical control in foundries was far too slow in being adopted, yet once introduced it was seen to be a big money saver. There is to-day a much greater awareness that although grandfather was a wonderful ironfounder the grandson must be much better.

It is my belief that foundries are now facing a crisis and to go on much longer as we mostly are to-day means extinction, yet with courage and vision there is a greatly improved and prosperous future ahead. You may not, probably do not, believe this, but if you are short of apprentices then before long your ability to produce large and intricate castings will disappear. Apprentices must be attracted to the foundries and this can be done in one of two ways, first by bribing with high wages, or in other words submit to a form of blackmail in which the demands will become stiffer and stiffer, or, alternatively, lift the whole status of foundries and foundrycraft. Is there any serious thought necessary to make the choice?

The late war showed the beneficial effect of clean, cheerful factories on quality and quantity of production in machining and assembling. The same results can and must be obtained in our foundries.

My co-directors have agreed to back these views by spending nearly a quarter of a million pounds in rebuilding and re-equipping our foundry, believing that in turbo-alternators it is not desirable to replace all castings by weldings although it may be possible. Therefore in the long-term plan the foundry must remain, and bribery is not the way to obtain good craftsmen, but attractive working conditions is the only solution.

SPECIAL ALLOY INDICATES TEMPERATURE CHANGES

A special chrome-cobalt alloy is said to show a marked colour change for every 25 deg. change in temperature from 500 to 700 deg. C., then it reverts back to its original colour and begins the colour scale over again in a higher range of from 725 to 900 deg. C. By making gas-turbine parts of the alloy, the General Electric Company in the United States have contrived to make the turbine take its own temperature. On the basis of one hour's heat-treatment, the alloy at 500 deg. C. turns a light straw colour, at 525 deg. a straw colour, at 550 deg. a bronze colour, at 575 deg. purple, at 600 deg. dark blue, etc. The alloy turns light blue at 700 deg., and, according to all precedent, it next should turn grey, indicating the end of the colour scale. Instead of turning grey, however, the alloy at 725 deg. C. reverts back to a light straw colour, and begins the progression of colours over again. The alloy turns light blue in the second scale when it reaches 900 deg. and begins to show greying tendencies at 925 deg. C.

GLANMOR FOUNDRY

In view of the reports which have appeared in the JOURNAL regarding the Glanmor Foundry, it is now possible to announce that satisfactory arrangements have been made with the Government which will enable the company to overcome its present difficulty and carry on with production. Mr. A. Whiteley, the managing director, was loaned to the company in 1943 after they had had several years of bad trading due to their efforts on war production which was entirely different from their normal peace-time trade. In 1944 the company turned the corner and was put on a profit-earning basis but with the end of the war the transition period made things more difficult and it was necessary to insist that it would be futile to carry on unless the Government were prepared to make a gesture to help.

The company is now looking forward to better times and as it is producing both iron and steel in addition to its other activities, there should be no difficulty in finding sufficient work for an indefinite period. The recent troubles at Glanmor have not affected the associated company of which Mr. Whiteley is also managing director and they are continuing to operate under normal conditions.

LECTURES ON MODERN FOUNDRY PRACTICE

Of direct interest to London foundry executives is a scheme emanating from the Northampton Polytechnic, St. John Street, London, E.C.1. The object is to provide a series of 12 lectures on "Modern Foundry Practice," to be given by specialists—one to be given each week, and to be followed by a discussion. Dr. Garside, who is organising the proposed course, would welcome criticisms and suggestions from executives as to the suitability of the following tentative list:—

"The Testing of Moulding Sands," "Mechanisation in the Foundry," "The Melting of Brasses and Bronzes," "Centrifugal Casting," "Die-casting," "The Production of Castings by the Investment Process," "The Melting of Cast Iron in the Electric Furnace," "High-duty and Special Cast Irons," "Temperature Measurement in the Foundry," "Technical Training for the Foundry Industry," and "The Marketing of Castings."

Well in advance of the time of the launching of the course, a definite notice will appear in our columns.

FOUNDRY TRADES EXHIBITION

F. W. Bridges & Sons, Limited, Grand Hotel Buildings, London, W.C.2, announce that they have now secured a tenancy from the Olympia authorities to provide for an exhibition being held from August 28 to September 13, 1947. This exhibition will form part of the Engineering and Marine Exhibition, which was regularly held biennially before the war.

REDESIGNED CASTING FACILITATES PRODUCTION

By "CHIP"

"Better a flash than a crush," is an old saying in the foundry. The obvious meaning being that it is better to remove flash in the fettling shop than to scrap a casting. To save time in the fettling department, however, an endeavour is often made to reduce "flash" to a minimum. Sometimes this minimum is too fine, and scrapped castings occur. Fig. 1 is a part plan and a section through a soleplate. It is essentially a trough casting with facing pieces, C, and hold-down bolt hole bosses, D. If these were cast

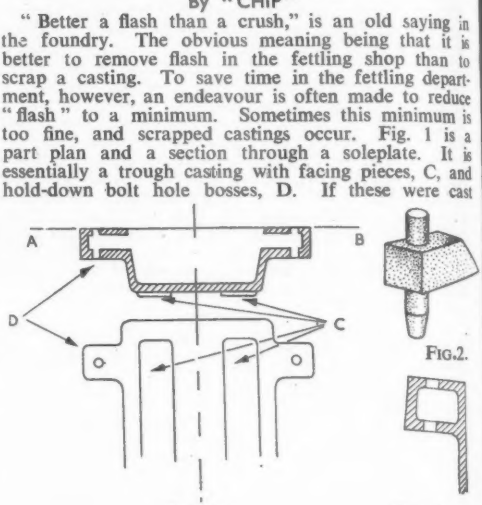


FIG. 1. FIG. 2. FIG. 3.

solid, fracture may occur on cooling, consequently these are lightened out by the same core that forms the hole for the bolts.

Fig. 2 shows one of the boss cores of which there are four in the casting. The joint of the mould is along AB, and the pod forming the interior, carried in the top box. When lowering, unless great care is exercised, it is almost certain that one or other of the four cores may be touched with disastrous results to the casting. A slight "flash" here is not detrimental, indeed, the casting would be better in many respects if it was redesigned to allow of metal along this edge of the core as scrap section (Fig. 3). By so doing, the danger of a "crush" is obviated, and no unnecessary 'flash" to be subsequently removed, is formed.

RUSSIAN FIVE-YEAR PLAN

The "Soviet News" has sent us two pamphlets dealing with the U.S.S.R. five-year plan. The first, which is called "Five-year Plan for the Rehabilitation and Development of the National Economy of the U.S.S.R.," costs a shilling; the second, "Report on the Five-year Plan," by N. A. Voznesensky, is priced at 6d. The former is nicely illustrated with pictures from the factory and countryside. Whilst no specific reference is made to the foundry industry, it is evident that several millions of tons of castings will be necessary for the carrying out of the plan. Industrial output is planned to yield an increase of 48 per cent. in 1950 over the 1940 figures.

SCIENTIFIC MAN-POWER

IMMEDIATE AIM—5,000 SCIENTISTS PER ANNUM

"The immediate aim should be to double the present output, to give 5,000 newly qualified scientists per annum at the earliest possible moment." This is the main proposal of a committee, with Sir Alan Barlow as chairman, appointed last December by Mr. Herbert Morrison to consider the policies which should govern the use and development of scientific man-power and resources during the next 10 years. The committee was to submit a report* on very broad lines to facilitate forward planning in those fields, and the findings of the committee are here summarised.

The committee have inquired into the procedure for expediting the return of scientists from the Forces to civil life and, believing that it is adequate to present needs, recommend no improvements. The fullest possible use should be made of the facilities offered by the Appointments Department of the Ministry of Labour. Applications for the release of experienced assistants under Class B should be considered sympathetically where it can be shown that, if release is not granted, the work of a scientist will be held up. Everything possible should be done to meet the immediate needs of universities for accommodation, particularly the needs of those that have suffered war damage.

Long-Term Requirements

The longer-term problems involved in the need for scientific man-power are discussed. An estimate of the position in 1950 and 1955 is as follows:—Minimum requirement of qualified scientists in 1950, 70,000, and in 1955, 90,000. The maximum number likely to be available if expansion in the output of graduates is limited to that envisaged in the returns furnished by the universities to the University Grants Committee:—In 1950, 60,000, and in 1955, 64,000. This reveals a deficit in 1950 of 10,000, and in 1955 of 26,000. It is essential, therefore, that the output of scientific graduates should be increased very much above the level of expansion at present envisaged by the universities; the immediate aim should be to double the present output, giving approximately 5,000 new scientists every year, at the earliest possible moment. There is available in the population a large reserve of innate intelligence. Its size is such that, while recognising the need for other qualities also, the committee assume that more suitable material can be found than could be taken into our universities by any degree of expansion practicable within the next 10 years. But financial assistance must be forthcoming on a larger scale if much of the available talent is not to be lost to the universities. Even if the total student population in British universities were doubled, this country would still fall short of a number of European countries and the United States of America in the relative provision which it makes for higher education.

The recommendation of the Percy Committee on higher technological education is supported, in that there should be developed at a selected and limited number of technical colleges, full-time technological courses of university degree standard. The status of these higher technological colleges and the bonds between them and the existing universities (including facilities for post-graduate research) should be strengthened wherever possible so as to raise the currency of technological qualifications. The increased facilities to be offered by technical colleges does not relieve the universities from their responsibility for training a high proportion of the nation's first-class technologists; the expansion in the output of graduates should be not less proportionately in technology than in pure science. Urgent consideration should be given to the development, preferably in university cities, of a few institutes of technology designed to maintain the highest possible standards of study and research; however, the humanities should not be sacrificed to the need for an increased output of scientists and technologists.

It is of great importance that the universities should be assured that in future they will be able to rely on adequate and continuing assistance from the Exchequer towards any project for which good cause is shown, as the committee are reasonably sure that even in the next few years there will be no lack of trained students to fill the expanding universities. A number of proposals are put forward which might help to mitigate the university accommodation problem, and great importance is attached to the provision of halls of residence and other facilities for corporate life in the civic universities. In science at least there is ground for believing that a vigorous drive for new university teachers would meet with a very considerable measure of success; certain detailed recommendations are given regarding the steps which the universities might take to secure additional teachers. To improve teaching efficiency, and to give individual teachers adequate time for their own research, any expansion in the number of students should be accompanied by a proportionately larger expansion in the number of teachers. Everything possible should be done to meet the demand of students from the Commonwealth and from foreign countries for places in British universities and to increase the size of the universities to enable these students to be accepted without excluding students from this country.

The Universities

The two ancient universities of Oxford and Cambridge should regard it as a duty to make a contribution towards meeting the nation's enlarged requirements for graduates; this might be possible by the enlargement of some of the smaller of the existing colleges or by the foundation of one or more new colleges. There is scope for an expansion in the student population of London University, although such expansion may involve adopting a policy of decentralisation. Regarding English Civic Universities and the University of Wales, a really substantial expansion depends to a considerable extent on the universities concerned being able to compete with Oxford, Cambridge and London for the limited supply of talented students; to this end the civic universities must improve their amenities and the educational authorities should consider urgently a revision of the scholarship system. The existing university colleges can be substantially expanded and the possibility of founding new university colleges and at least one new university in large centres of population should

* H.M. Stationery Office, 6d. net.

be considered, ensuring that adequate facilities for research are available for post-graduate students and for university staffs. Even when all possible measures have been taken to expand the output of graduates, the nation will certainly be seriously short of scientists.

In the allocation of the limited supply of scientists during the reconstruction period the order of preference should be:—(i) Teaching and fundamental research; (ii) civil science, both government and industrial; (iii) defence science. It is important to maintain an adequate nucleus of able scientists working on the problems of defence, and this order of priority should be kept under constant review by the Government. As one means of implementing this order of priority the attractions of an academic career should be improved. The provision of more secretarial assistance and office machinery for university teachers would not only contribute to this end, but would materially increase the efficiency of the universities. It is not thought that the universities need be deterred from expanding their facilities in order to produce 5,000 scientific graduates per annum by any fear that this will leave them with excessive staffs and accommodation once the demand for qualified scientists has levelled out.

Implementation of Proposals

It is hoped that an increase in Exchequer grants to the universities will not result in a diminution in private benefactions. If these proposals are accepted by the Government, their implementation must not involve any infringement of the independence of the universities; but it is thought that such independence is not inconsistent with a greater degree of co-ordination between university policy and the needs of the country than has existed in the past. The Government's part in any expansion programme should be the responsibility of the University Grants Committee, which ought to be put in a position to concern itself more positively with university policy than it has done in the past.

In conclusion, the committee point out that they would like to guard themselves against an imputation to which they fear that their report may lay them open, namely, that they are imbued with a narrowly materialistic view of the functions of a university. They are well aware that the training of specialists is not the only or even the most important function of a university and they know that the universities themselves will strive to ensure that every student can seek the full life within their precincts and that specialised knowledge is not bought at the expense of wisdom.

MR. GEORGE BUCHANAN, Under-Secretary for Scotland, recently visited a number of Scottish light-castings foundries and saw how some bottlenecks in the housing programme are being eliminated by increased mechanisation in the industry. Among the works visited by Mr. Buchanan were those of Saunders & Connor (Barrhead), Limited, Walter MacFarlane & Company, Limited, Saracen Foundry, Glasgow, Grangemouth Iron Company, Limited, Falkirk, and Camelon Iron Company, Limited, Falkirk.

KING'S BIRTHDAY HONOURS

The King's Birthday Honours List, published last week, contains several names well known in the iron, steel and engineering industries. They include:—

Knights Bachelor

MR. WILLIAM THOMAS GRIFFITHS, D.Sc., chairman and managing director, Mond Nickel Company, Limited.

MR. HENRY WARD LIONEL KEARNS, C.B.E., Director-General of Production Services, Ministry of Supply. He is a director of Bromilow & Edwards, Limited.

MR. ALEXANDER LOWE MCCOLL, chairman, Lubricating Oil Committee, Petroleum Board. Chairman of the Superheater Company, Limited, and a director of Glenfield & Kennedy, Limited.

MR. CHARLES JOHN GEOFFREY PALMOUR, chairman of Harland & Wolff, Limited.

MR. CLIFFORD COPELAND PATERSON, O.B.E., D.Sc., a director of the General Electric Company, Limited.

MR. ARTHUR JOHN GRIFFITHS SMOUT, Director-General of Ammunition Production, Ministry of Supply. A director of Imperial Chemical Industries, Limited.

K.B.E.

MR. ARCHIBALD A. JAMIESON, C.B., chairman of Vickers, Limited.

SIR PERCY HERBERT MILLS, President, Economic Sub-commission, British Element, Control Commission for Germany. Chairman of Southall & Smith, Limited, and the Soho Automatic Machine Company, Limited, and managing director of W. & T. Avery, Limited.

MR. EDWIN NOEL PLOWDEN, Chief Executive, Ministry of Aircraft Production. A director of Power Jets (Research & Development), Limited.

C.B.E.

MR. THOMAS FRASER, director, Metropolitan Vickers Electrical Company, Limited.

MR. ALBERT WILLIAM GRANT, chairman of the Engineering and Allied Employers' West of England Association.

MR. HAROLD GRINSTED, O.B.E., Director of Technical Research and Development, Ministry of Aircraft Production.

MR. ARTHUR ALBERT ROWSE, chairman, S. G. Brown, Limited, Langley Alloys, Limited, and other companies; director of Metal Castings, Limited, and Webley & Scott, Limited.

MR. EDWARD WILFRED TAYLOR, joint managing director, Cooke, Troughton & Simms, Limited.

MR. CHARLES REGINALD WHEELER, lately Controller of Iron and Steel, Ministry of Supply. Director of Guest Keen Baldwins Iron & Steel Company, Limited.

THE 150TH ANNIVERSARY of the formation of Newton Chambers & Company, Limited, ironfounders, etc., of Thorncliffe, near Sheffield, will be commemorated during the first week of July. Nearly a thousand of their employees are co-operating in the production of a pageant in the Sheffield City Hall, which will portray the history of Thorncliffe.

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STANTON
HOLWELL
or RIXONS
SAND-LESS
MACHINE CAST
PIG IRON
THE STANTON IRONWORKS COMPANY
LIMITED NEAR NOTTINGHAM

NEWS IN BRIEF

NU-MEL & NU-ENAMEL PRODUCTS CONTROL COMPANY, LIMITED, is to be wound up voluntarily. Mr. G. W. Roberts, 2, Darley Street, Bradford, is the liquidator.

"TRIPLEX" (CONTINENTAL), LIMITED, is being wound up voluntarily. Mr. F. S. Bray, of Tansley Witt & Company, 5, Chancery Lane, London, W.C.2, is the liquidator.

MOORFIELD ENGINEERING COMPANY (DENTON), LIMITED, is being wound up voluntarily. Mr. F. A. Pitt, 14, John Dalton Street, Manchester, 2, is the liquidator.

SHAW'S ENGINEERING WORKS, LIMITED, is being wound up voluntarily. Mr. C. H. Bryant, of Baskett & Bryant, St. Stephen's House, Victoria Embankment, London, S.W.1, is the liquidator.

WEST END SHEET METAL & ENGINEERING COMPANY, LIMITED, is to be wound up voluntarily. Mr. R. F. Bendall, of Poppleton & Appleby, 31, Lloyd Street, Manchester, 2, is the liquidator.

FOR THE FIRST TIME in the history of the chain and anchor trades male workers are to be paid for public holidays, a concession which was recently granted to females in the electric welding section.

DEALINGS HAVE COMMENCED in the new 300,000 ordinary £1 shares of R. A. Lister & Company, Limited, engineers and ironfounders, of Dursley, Glos. The capital of the company was recently increased to £1,300,000.

TREASURY CONSENT has been obtained for a public issue of 250,000 5½ per cent. cumulative preference shares of £1 each in the London Aluminium Company, which represents the whole of the preference capital of the company.

THE PLACING OF 200,000 ordinary shares of Banks & Davis, non-ferrous founders, etc., of Deritend, Birmingham, has been arranged, and permission to deal in the shares on the Birmingham Stock Exchange is to be applied for.

THE NORTH-EAST ENGINEERING BUREAU have prepared a scheme which will provide a number of engineers trained in scientific production and management. The scheme provides for six apprentices drawn equally from the Tyne, Tees and Wear areas.

THE DIRECTORS OF Drake & Gorham, Limited, manufacturing electrical and hydraulic engineers, 36, Grosvenor Gardens, London, S.W.1, propose to redeem the whole of the outstanding 5½ per cent. debenture stock and to issue new 5 per cent. redeemable preference.

RENOLD & COVENTRY CHAIN COMPANY, LIMITED, Didsbury, Manchester, have acquired an additional factory at Cardiff. The factory covers a floor area of 130,000 sq. ft. and provides facilities to meet the increasing pressure of power transmission business.

SIEMENS BROS. & COMPANY, LIMITED, electrical engineers and contractors, announce that they have leased a factory in Durham, in view of an acute shortage of labour at their Woolwich works; a factory in Yorkshire has been bought for a subsidiary for the same reason.

THE PARTNERSHIP between Allan Roberts and Percy Roberts, carrying on business as brassfounders at Valley Brass Works, Cleckheaton, under the style of William Roberts & Sons, has been dissolved by mutual consent. The business will be carried on in future by Percy Roberts.

THE PARTNERSHIP between James Henry Young and William Bertram Young, carrying on business as engineers at 1A, Holmdale Terrace, Stamford Hill, under the style of J. H. & W. B. Young, has been dissolved by mutual consent. The business will be carried on in the future by W. B. Young.

IN ORDER TO stimulate the interest of typists and other non-technical members of their staff in their daily duties, Hadfields, Limited, of Sheffield, are giving short lectures on the manufacturing processes conducted at the East Hecla Works, followed by tours of the plant, so that the staff may see for themselves the various operations being carried out.

OBITUARY

MR. ERIC MARTIN SMEETH, who died recently, was a partner in the firm of Thos. S. Smeeth, iron, steel and coke merchants, of Bradford.

MR. J. E. A. BLYDE, founder and head of A. Blyde & Company, Limited, Wallace Steelworks, Eyre Street, Sheffield, died recently, aged 79.

MR. JOHN MAUGHELING, a director of John I. Thornycroft & Company, Limited, engineers, shipbuilders, etc., with whom he had been associated for 44 years, died in London on June 11. He was 72 years of age.

MR. JAMES H. ALLAN, who was formerly a director of Smith & Wellstood, Limited, stove, range and boiler manufacturers, of Bonnybridge, Stirlingshire, has died at the age of 84. He had been in failing health since his retirement from active business life a year ago.

CONSUMPTION OF NON-FERROUS METALS

Detailed figures of consumption of non-ferrous metals in the United Kingdom during the first quarter of 1946 (covering zinc, lead, tin, nickel, cadmium, antimony, cobalt and manganese) have been issued by the Directorate of Non-Ferrous Metals. Consumption of virgin metals was as follows:—

	Total for 1945.	First Quarter, 1946.
	Tons	Tons
Zinc	173,323	50,653
Lead	223,591	55,426
Tin	16,396	5,421
Nickel	8,388	2,098
Cadmium	439	127
Antimony	5,258	1,490
Cobalt	648	149
Manganese metal ..	490	136

Design by Eric Fraser

MOSAICS OF STEEL

NUMBER FIVE

Rail production at Workington is integrated. West Coast hematite ores and other minerals mined locally, together with coke made in the vicinity are processed to produce the pure low sulphur and phosphorus irons. These irons are converted into steel by the Acid Bessemer process, a particular method which is unique for this country. Rails made from Acid Bessemer steel have inherent properties of wear resistance not found in steels made by other processes. Extra durability is further imparted by carefully controlled heat treatment (sorbitising). For these reasons the home railways use immense tonnages of Workington Acid Bessemer rails. The many large consignments for overseas railways are shipped direct from the Port of Workington.

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THE UNITED STEEL COMPANIES LIMITED

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WORKINGTON IRON & STEEL CO., WORKINGTON
UNITED COKE & CHEMICALS CO. LTD., CUMBERLAND

THE ROTHERVALE COLLIERIES, TREETON
THE SHEFFIELD COAL CO. LTD., TREETON
THOS. BUTLIN & CO., WELLINGBOROUGH

USP.4

PERSONAL

SIR WALTER MCLENNAN CITRINE, K.B.E., general secretary of the Trades Union Congress, who is retiring after 20 years to take a post on the National Coal Board, received a barony in the Birthday Honours List.

MR. EDWARD DE STEIN, lately director, Raw Materials Finance, Board of Trade, and a director of the British Power & Light Corporation, Limited, and other companies, receives a knighthood in the Birthday Honours List.

MR. R. E. THOMAS, secretary of Jarrow Tube Works, Limited, has been appointed secretary of Jarrow Rotary Club.

MR. D. W. SINCLAIR, secretary and latterly a director, has retired after 56 years' service with Rankin & Blackmore, Limited, Eagle Foundry, Greenock.

MR. J. C. MAHANNAH has relinquished his position as managing director of Kelsey-Hayes Wheel Company, Limited, and MR. W. F. NEWBURY has been appointed in his stead.

MR. J. K. ANDERSON, JUNR., MR. E. F. ROBSON, and MR. A. L. RINTOUL have been appointed additional directors of Fairbairn Lawson Combe Barbour, Limited, textile and general engineers, brass and iron founders, of Leeds.

MR. A. DYSON, joint managing director of Horseley Bridge & Thomas Piggott, Limited, constructional engineers, ironfounders, etc., of Tipton, Staffs, was elected president of the Institute of Welding at the recent annual meeting.

MR. A. HOWARD BECKE, secretary of John Readhead & Sons, Limited, shipbuilders, engineers, etc., of South Shields, has received a presentation from officials of the company to mark his receiving the award of the M.B.E. Mr. Becke has been with the company for 36 years.

DR. C. E. HOMER has been appointed to the metallurgical staff of the research department of Tube Investments, Limited. He has previously been associated with the Tin Research Institute, Vickers-Armstrongs, Limited, Castle Bromwich, and, latterly, with Darwins, Limited, of Sheffield.

MR. GILBERT HALLAM, who for 43 years represented Edgar Allen & Company, Limited, Imperial Steel Works, Sheffield, in that area, retired recently. MR. B. BLACKWELL GREEN, formerly works manager of the trackwork department of the company, has been appointed representative to cover approximately the same area. MR. H. W. T. MASON is to retire from the London office at the end of August, and MR. E. E. PAYNE, until recently general manager of the machinery department and the British "Rema" Manufacturing Company, Limited, Sheffield, has been appointed London manager of the engineering division. MR. W. J. MCBRIDE has been appointed manager of the engineering department at Sheffield. MR. J. DAVIS has been appointed manager of the British "Rema" Manufacturing Company, Limited, at Sheffield.

COMPANY RESULTS

(Figures for previous year in brackets.)

Harland & Wolff—Dividend of 7% (same).

Keith Blackman—Dividend of 20% (same).

Sanbra—Interim dividend of 5% on increased capital (same).

Richard Hill & Company—Interim dividend of 3% (same).

Warne, Wright & Rowland—Final dividend of 17½%, making 25% (same).

Tweedales & Smalley (1920)—Final dividend of 12½%, making 17½% (same).

Gerrard Industries—Final dividend of 10% and bonus of 5%, making 25% (same).

Banister, Walton & Company—Final dividend of 20% (15%) and bonus of 5% (nil), making 30% (20%).

Harrison (Birmingham)—Profit for 1945, £51,520 (£47,917); dividend of 4s. per share, tax free (same); forward, £109,661 (£110,762).

Howard & Bullough (Securities)—Profit for the year to March 31, £34,159 (£34,598); dividend of 5% (same); forward, £578 (£1,669).

West's Gas Improvement—Final dividend of 5% and bonus of 2½%, making 12½% (10%); bonus of ½% on the 10% participating preference shares.

Romac Industries—Profit to September 30, after depreciation, £14,704 (£15,854); dividend of 7½% (same) and bonus of 2½% (same); forward, £501 (£673).

A. C. Wickman—Net profit, before tax, for 1945, £68,369 (loss of £54,511); to general reserve, £25,000 (£40,000); dividend of 5% (nil); forward, £42,289 (£43,603).

Newall Engineering Company—Trading profit for the year to March 31, after depreciation, £39,134; final dividend of 20%, making 30%; forward, £13,401 (£10,148).

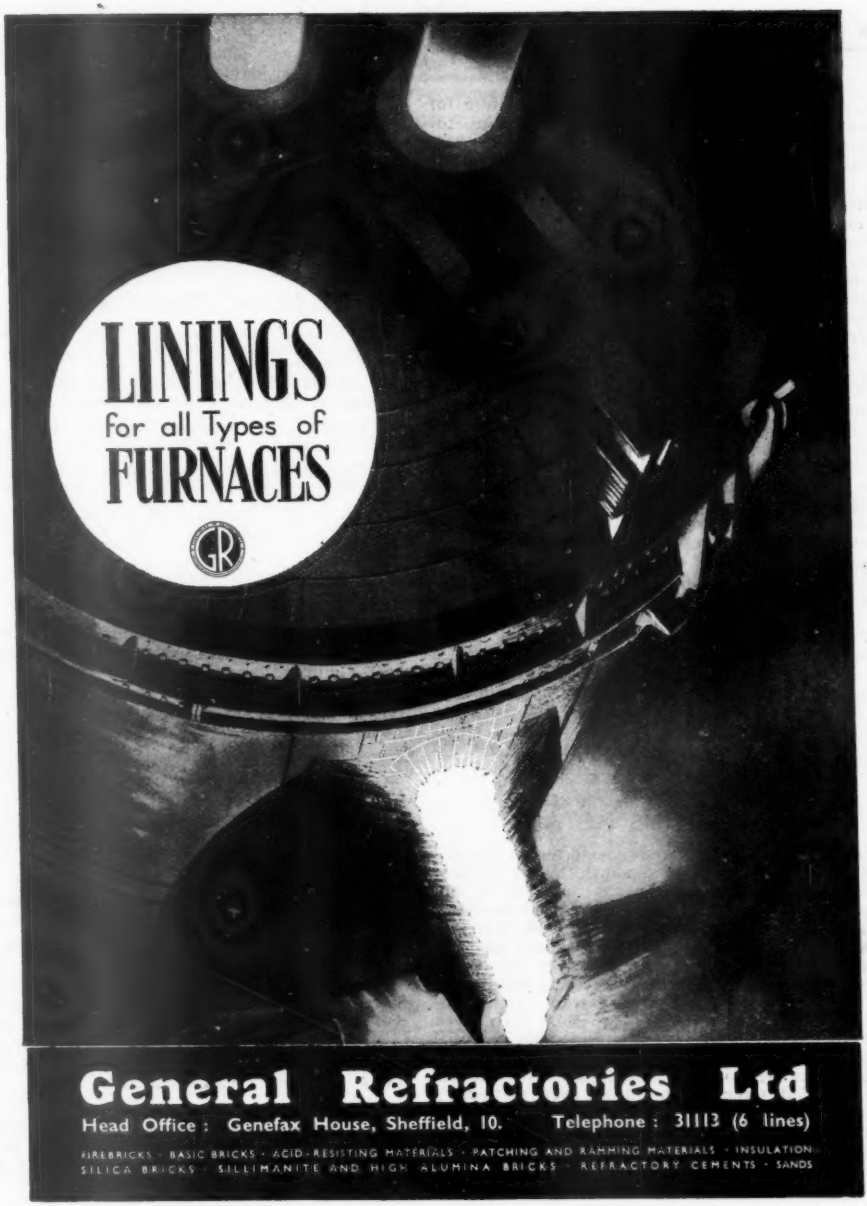
John Harper & Company—Profit for the year ended March 31, 1946, £30,470 (£27,686); final dividend of 11¼%, making 16¼% (same); forward, £25,892 (£17,125)

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bedlington, June 25—3-in. and 4-in. cast-iron water mains and specials, valves, tees, etc., for the Bedlingtonshire Urban District Council. Mr. W. Hall, engineer and surveyor, Council Offices, Bedlington.

Shrewsbury, June 25—Providing and laying of approx. 659 yds. of 3-in. dia. cast-iron water main, for the Rural District Council. The Surveyor, 24, St. John's Hill, Shrewsbury.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Raw Material Markets

IRON AND STEEL

There has been some abatement of the pressure for pig-iron during the past week or so. Hematite, for example, is fairly freely obtainable and so, too, are low- and medium-phosphorus irons. On the other hand, makers of refined iron are readily clearing their outputs and there has been a marked improvement in the call for ferro-manganese. The light foundries are fully capable of absorbing the whole of the output of No. 3 iron, and production of basic iron no more than balances the heavy requirements of the steel furnaces.

Although imports of semi-finished steel in the form of billets, blooms, etc., have shrunk to small proportions, and home production has increased, the re-rolling industry is still to some extent dependent on overseas supplies. These, however, are sparingly distributed and embarrassments are only avoided by the use of defectives, double-sawn crops and any material which can be rolled into small bars, etc. The heavy requisitions for sheet bars are fairly well covered, but small square and flat billets are scarce and bigger outputs are urgently needed.

Extended delivery dates now indicated by the rollers of steel plates reveal the extent of their present commitments. It has become difficult to place an order for the lighter gauges for delivery earlier than the fourth period, and the heavy tonnages required for the shipyards and wagon builders are imposing unavoidable restrictions on the acceptance of export orders. Many inquiries for steel plates and black and galvanised sheets from foreign and Dominion buyers simply cannot be entertained, but mills are still turning out considerable tonnages of heavy sections, rails, fishplates, etc., for shipment. At the wire mills, stocks of billets are low, but they have plenty of work on hand and the tube makers are also increasing their outputs.

NON-FERROUS METALS

Following the recent announcement that a Departmental Committee was to be appointed by the Minister of Fuel and Power to investigate the Cornish tin-mining industry, and that results of wartime prospecting had proved disappointing, Mr. F. Lyde Caunter, vice-chairman of the Cornish Tin Mining Advisory Committee, has stated that the values of tin ore in certain mines in the Cornish area, including particularly those in East Cornwall and West Devon, where mining has not been so extensive, are such that, given proper management and trial, a considerable potential mining area exists. Pointing out that most of the old Cornish mines are not economic to-day, Mr. Caunter emphasises that some are profitable even at to-day's increased costs.

Production of tin concentrates in Malaya during the first quarter of 1946, according to the bulletin of the Chief Inspector of Mines in Malaya, amounted to 802 tons (tin contents). About half of this quantity was obtained from hand-washing ("dulang" mining) and the remainder mainly from Chinese-operated gravel pump mines. In March, 91 mines, including four dredges, were operated on a restricted scale, compared with 75 in January and 80 in February. No dredges were operating in January or February. The labour force employed in tin mining increased from 11,363 in January to 13,292 in March.

Uncertain conditions prevail in the U.S. zinc industry, where an increase in the official "ceiling" price is expected to be authorised by the Office of Price Administration in the near future.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"ANOPRINT"—Light aluminium alloys. DECORAL PRODUCTS, LIMITED, 1, Redcliffe Street, Bristol, 1.

"FERLOY"—Ferro-alloys. INTERNATIONAL COMBUSTION, LIMITED, 19, Woburn Place, London, W.C.1.

"CYCARC"—Electric arc-welding apparatus. STELMAR, LIMITED, 27-29, New North Road, London, N.1.

"KENNEDY"—Bending machines. WILLIAM KENNEDY, Station Works, Warwick Road, West Drayton, Middx.

"STRACOL"—Firebricks. A. R. STRAFFON & COMPANY, 1B, Braemar Road, Barking Road, Plaistow, London, E.13.

"MAXIMATIC"—Lathes, and machine tools employing cutting tools. DRUMMOND BROS., LIMITED, Rydes Hill, Guildford.

"A1 LION BRAND" AND DEVICE—Metal hollow-ware. ALUMINIUM INDUSTRIES, LIMITED, Lion Works, Engine Lane, Lye, Worcs.

"ECOFIX"—Plates, sheets, strips, bars, rods, tubes, etc. ECOFIX, LIMITED, Aerolex Works, Bridge Road, Camberley, Surrey.

"OPTIDYNE"—Dynamos, transmission gear, internal combustion engines, etc. DYNOWORKS, LIMITED, 89, Woodstock Road, Oxford.

"DEREN" AND THISTLE DEVICE—Resistances, rheostats, circuit-breakers, etc. DE RENZI HOLMES & COMPANY, LIMITED, Fox's Lane, Wolverhampton.

"THINKER"—Controls for air-conditioning and ventilating apparatus. CARRIER ENGINEERING COMPANY, LIMITED, Carrier House, Catherine Place, London, S.W.1.

"EUTECTRODE"—Rods, wires and sheets for use in welding, brazing and soldering. EUTECTIC WELDING ALLOYS COMPANY, c/o Albert L. Mond & Thiemann, 14-18, Holborn, London, E.C.1.

A FIRE which broke out in the moulding shop roof of Messrs. Bartles (formerly known as Bartles Foundry), Carn Brea, Cornwall, on June 14, was dealt with by the works fire brigade.